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LISTS OF SPECIES

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Fourteen new additions to the list of birds of Quindío department, Colombia

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Abstract: Recent records of bird species in the Colombian Andes have shown that this region is not as well known as was previously believed. We compiled data from a major collection of Colombian birds and from our recent field observations to complement the bird species list of Quindío department. We report the addition of 14 species to Quindío's checklist and data of museum vouchers for 12 species reported only from field observations. The majority of additions were from localities below 1,900 m above sea level, a zone that has been highly transformed by human activities. Our dataset, and other information, raised the number of bird species in Quindío to 560. This information must be considered in decisions about the land use in this region of the Colombian Andes.

Key words: Andes, Aves, biodiversity, new records, South America

INTRODUCTION

The basic knowledge of biodiversity in megadiverse countries is incomplete even for relatively well studied taxa such as birds (e.g., Cuervo et al. 2006). For instance, Colombia is the richest avian species country, but the number of known species is still increasing, both from descriptions of new species and from new records of species (Stiles et al. 2011; Arbeláez-Cortés 2013a; Donegan et al. 2013, Caycedo et al. 2014; Donegan et al. 2014). The new records of species are common among scientific publications about Colombian biodiversity, and are instrumental to complement taxon lists at several geographic levels (Arbeláez-Cortés 2013b). Particularly, new records of bird species in the Colombian Andes have shown that this region is not as well known as was previously thought, and have been useful to rethink biogeographical patterns and to redefine ranges for species of conservation concern (Cuervo et al. 2003, 2005; Arbeláez-Cortés and Baena-Tovar 2006; Leal et al. 2011; López-Ordóñez et al. 2013; Martínez-Gómez et al. 2013).

In Colombia, information on species richness by department (i.e., first administrative level in Colombian political division) besides being scientifically valuable is also useful to democratize knowledge of regional biodiversity and to plan rationally the use of the land (e.g., *Planes de Ordenamiento Territorial*). Quindío, located on the western slope of the central Andes, is the smallest mainland department of Colombia. Despite its small size (196,183 ha), field observations, an online database of ornithological collections, and published literature indicate that there are at least 543 species of birds in Quindío, which represents nearly 30% of the Colombian avifauna (Arbeláez-Cortés et al. 2011).

However, the work of Arbeláez-Cortés et al. (2011) did not includes information from *Colección de Aves de Colombia del Instituto de Investigación de Recursos Biológicos Alexander von Humboldt* (IAvH-A). Besides, the increase of tourism in Quindío has increased bird-watching activities, as reflected by several records in e-bird (Sullivan et al. 2009). In fact, recent field observations in Quindío (Marín-Gómez 2012; Donegan 2013; Ramírez-Urrea et al. 2014) have resulted in new records of species. Here we compiled data from IAvH-A and from our field observations, to complement the bird species list of Quindío. We comment on some details about the ranges of the species added to the list and discuss briefly some records for Quindío reported in e-bird.

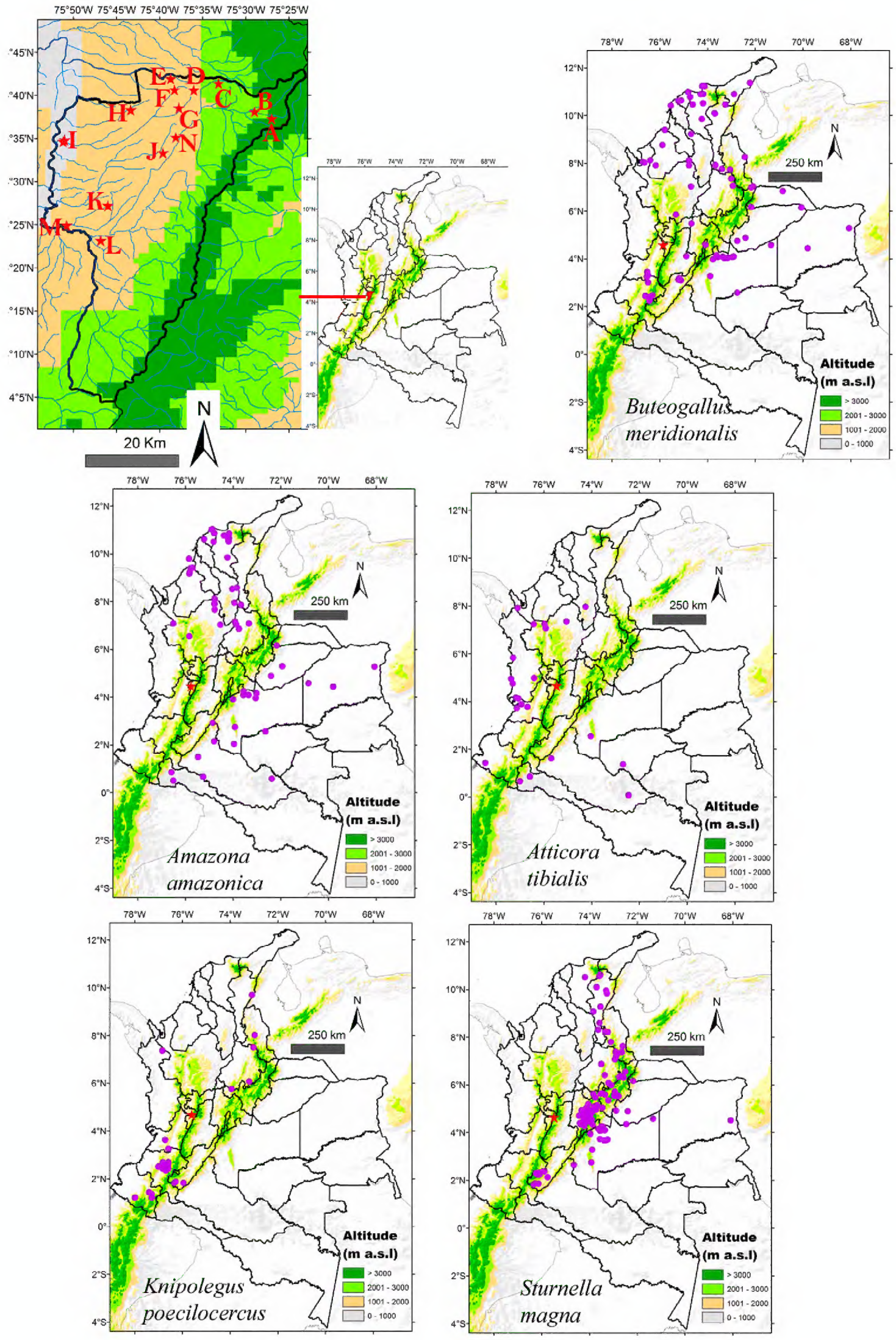


Figure 1. Maps depicting the location of Quindío in Colombia and the localities of the species records (above left). The remaining maps depict the vouchered records of five species in other Colombian departments which are more than 100 km from the records for Quindío. In the Quindío map, localities are: A) Rincón Santo P.N.N Los Nevados, Salento; B) Valle de Cocora, Salento; C) Reserva Natural La Patasola, Salento; D) Near alto del Roble, Filandia; E) Cañón del río Barbas, Filandia; F) Filandia town; G) Bosque el Silencio, Circasia; H) Vereda El Paraíso, Filandia; I) Finca Paraíso Verde, Quimbaya; J) Universidad del Quindío, Parque el Bosque y Parque de la Vida Armenia; K) Aeropuerto El Edén, La Tebaida; L) Finca Hotel Rancho California, Calarcá; M) Finca el Rodeo, Vereda Pisamal, La Tebaida; N) San Juan road between Armenia and Salento.

MATERIALS AND METHODS

Study site

The records presented here are from Quindío department on the western slope of the Colombian central Andes (Figure 1). Details about Quindío may be found in Arbeláez-Cortés et al. (2011), but in brief Quindío is characterized by steep topography, including elevations from 950 to 4,750 m above sea level (a.s.l.) The annual mean temperature and precipitation vary locally from 5 to 24°C and from 1,500 to 4,700 mm/year, respectively. Landscape matrix is composed of agricultural plantations, livestock pasture, and native forests with different levels of fragmentation, from relatively connected in the highlands to severely fragmented in the lowlands.

Data collection

In November 2013 three of us (EAC, MdSS and FF) reviewed in IAvH-A (Villa de Leyva, Boyacá, Colombia) the bird specimens collected in Quindío, focusing on those species not reported, or reported without a voucher, in Arbeláez-Cortés et al. (2011). One of us (JEMS) participated in an expedition to Quindío in 1984, and being the collector of several of the IAvH-A specimens, revised and added information about the expedition. Additionally, one of us (JIGZ) studied a new collection of birds from Quindío (Armenia, Quindío), which is based on salvaged specimens (dead by collisions with human constructions or killed by pets) in order to compile their scientific information. During February and June of 2014 we compiled information from our fieldwork between 2011 and 2014, and one of us (OHMG) reviewed in detail his field notebooks and picture files, made since 2002, to search for records that could have passed unnoticed and to corroborate the identification of some species. Finally, in March 2014 we reviewed the records for Quindío available at e-bird (Sullivan et al. 2009) to search for species neither recorded by us nor reported in the species list of Quindío (Arbeláez-Cortés et al. 2011). To determine if these e-bird species could be considered possible in Quindío we consulted major sources of information about their ranges (Hilty and Brown 1986; Ridgely and Tudor 1994; Restall et al. 2007; Ridgely and Tudor 2009; IUCN 2014). Taxonomy and nomenclature of the species presented here follows the classification of the South American Checklist Committee (Remsen et al. 2015).

Data analysis

We determined the records representing additions of species to Quindío following criteria used by McKelvey et al. (2008) and Less et al. (2014). We only chose those records that were properly supported by evidence such as vouchers in scientific collections, photographs showing diagnostic characteristics, or detailed observations in the field of species that according to published data and knowledge could occur in this region of the Central Andes of Colombia. To analyze our data in a geographic context, we obtained primary occurrence localities from vouchers of these species in other Colombian departments. These primary occurrence localities were obtained by searching in three sources (BioMap Project / Darwin Database 2003; Global Biodiversity Information Facility 2014; SiB-Colombia 2014). We only used primary records based on vouchers corresponding to individuals in collections and to audio records from *Colección de Sonidos Ambientales del Instituto de Investigación de Recursos Biológicos Alexander von Humboldt* (IAvH-BSA). The geographical coordinates were obtained directly from the primary occurrence sources when available; if not, we used electronic and printed gazetteers (Paynter 1997, GeoNames 2013) or searches on Google Earth™ (Google 2010) to georeference these records. Finally, we mapped the whole set of records using ArcGIS™ 9.1 (ESRI 2009) and measured the distance between our new records for Quindío and the nearest geographical record of each species in another Colombian department. We discuss our additions of species to Quindío considering this geographic information and information from the literature.

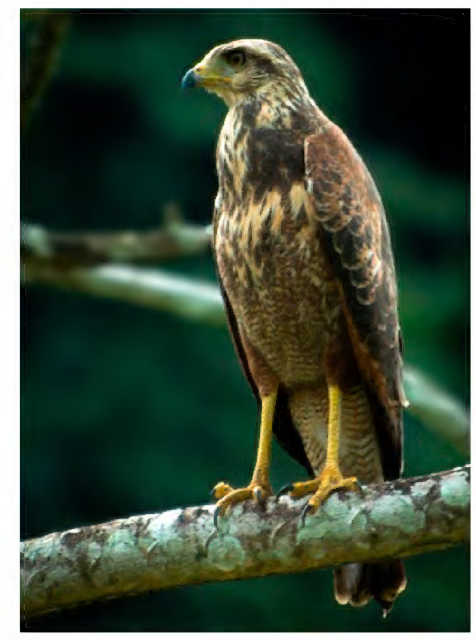
RESULTS

We determined that the records of 14 species represent additions to Quindío. We also found additional vouchered evidence for 12 species previously reported for Quindío only from field observations. Among those 14 additions, three species are represented by vouchers at IAvH-A: *Grallaricula flavirostris* (IAvH-A 6761), *Myiotriccus ornatus* (IAvH-A 6742) and *Atticora tibialis* (IAvH-A 6759) all of them collected in 1984 from Rincón Santo, Parque Nacional Natural Los Nevados, Salento, Quindío (04°39′30″ N, 075°28′30″ W, between 2,860–3,100 m a.s.l) during an expedition of INDERENA (i.e., the disappeared *Instituto Nacional de Recursos Naturales*, which was the base of the present IAvH's biological collections).

The photographic records and field observations yielded 12 additions of species to Quindío's bird list. One of them (*M. ornatus*) was also found as a voucher at IAvH-A. The other species are: *Sarkidiornis melanotos, Buteogallus meridionalis, Amazona amazonica, Crotophaga major, Aeronautes montivagus, Calliphlox mitchellii, Conopophaga castaneiceps, Knipolegus poecilurus, Rhynchocyclus fulvipectus, Vireo flavoviridis* and *Sturnella magna*. These species were observed at several localities in six municipalities of Quindío, between 900 and 2,800 m a.s.l, but the majority were from the elevational belt between 1,100 and 1,900 m a.s.l. Details on the record of each species are in Table 1 and photographs of eight species are in Figure 2. The linear distances between our records

Table 1. Species added to the birds of Quindío, Colombia.

Species	Locality	Date	Evidence	Closest locality with a voucher of the species
Sarkidiornis melanotos (Pennant, 1769)	Finca Hotel Rancho California, Calarcá, Quindío	A) 9 February 2014, B) 10 March 2014	A) Observation and photos of 12 individuals by DDM and GP in an artificial lake B) Observations, by DDM and OHMG, of five individuals in a flock including several individuals of *Anas discors* and *Dendrocygna autumnalis*. See Figure 2A	Laguna del Conchal, Buga, Valle del Cauca. 62 km from the Quindío locality
Buteogallus meridionalis (Latham, 1790)	A) Finca Paraíso Verde, Quimbaya, Quindío. B) Reserva Natural La Montaña del Ocaso, Quimbaya, Quindío	A) 19 October 2013, B) 6 January 2014	A) One individual observed by JIGZ flying up to 15 m over a livestock pasture B) Observation and photo of one individual (probably a sub-adult) perched in a tree. See Figure 2B	Espinal, Tolima. In the eastern slope of the central Andes. Around 119 km from the Quindío localities
Amazona amazonica (Linnaeus, 1766)	Aeropuerto El Edén, La Tebaida, Quindío	Several times from 2012 to 2014	Observations of groups including up to 30 individuals and some pictures. See Figure 2C	Cuenca alta Río Pato, PNN Los Picachos, Caquetá. 200 km from the Quindío locality
Crotophaga major Gmelin, 1788	A) Reserva Natural La Montaña del Ocaso, Quimbaya, Quindío. B) Finca Hotel Rancho California, Calarcá, Quindío	A) 6 January 2014, B) 9 February 2014	A) Observation of one indivual, which vocalized, in a bamboo forest (*Guadual*) B) Observation by DDM and picture by GP. See Figure 2D.	Cartago, Valle del Cauca. Around 20 km from the Quindío localities
Aeronautes montivagus (Orbigny & Lafresnaye, 1837)	Finca el Rodeo, Vereda Pisamal, La Tebaida, Quindío	10 February 2013	One individual observed by JIGZ within a flock of *Pygochelidon cyanoleuca*. The flock was flying low over a plowed field, and the individual of *A. montivagus* was in the low level of the flock flying faster than the other individuals.	Anzoategui, Tolima. In the eastern slope of the central Andes. 63 km from the Quindío locality
Calliphlox mitchellii (Bourcier, 1847)	A) Vereda El Paraíso, Filandia, Quindío B) Filandia town, Quindío C) Armenia, Quindío	A) 2011, B) 15 November 2012, C) 2 August 2014	A–B) Observations and photos of one female by PJC, including an individual observed in a garden. C) Observation and photos by AB of a male visiting a hummingbird feeder. See Figure 2E.	Santa Cecilia, Pueblo Rico, Risaralda. 79 km from the Quindío locality
Conopophaga castaneiceps P. L. Sclater, 1857	Bosque el Silencio, Circasia, Quindío	19 May 2007	Picture of one individual mistnetted by OHMG. See Figure 2F.	La Selva, Pueblo Rico, Risaralda. 76 km from the Quindío locality
Grallaricula flavirostris (P. L. Sclater, 1858)	Rincón Santo P.N.N Los Nevados, Salento, Quindío	10 November 1984	Vouchered specimen (IAvH-A 6761) collected by JEMS during field work at INDERENA	La Selva, Pueblo Rico, Risaralda. 86 km from the Quindío locality
Atticora tibialis (Cassin, 1853)	Rincón Santo P.N.N Los Nevados, Salento, Quindío	10 November 1984	Vouchered specimen (IAvH-A 6759) collected by JEMS during field work at INDERENA	Juntas de Tamaná, Chocó. 110 km from the Quindío locality
Myiotriccus ornatus (Lafresnaye, 1853)	A) Rincón Santo P.N.N Los Nevados, Salento, Quindío B) San Juan road between Armenia and Salento, Quindío C) Reserva Natural La Patasola, Salento, Quindío.	A) 11 November 1984, B) 2011, C) 14 October 2012	A). Vouchered specimen (IAvH-A 6752) collected by JEMS during field work at INDERENA B) Individuals observed by OHMG and C) JIGZ.	La Selva, Pueblo Rico, Risaralda. Around 76 km from the Quindío localities.
Knipolegus poecilurus (Sclater, PL, 1862)	A) Near to alto del Roble Filandia, Quindío B) Reserva Natural La Patasola, Salento, Quindío	A) 9 March 9 2014, B) 21 July 2012	A) Observations and photos by AB. See Figure 2G B) Observation by S. Chaparro-Herrera.	La María, Valle de Dagua, Valle del Cauca. 169 km from the Quindío locality
Vireo flavoviridis (Cassin, 1851)	A) Universidad del Quindío, Armenia, Quindío B) Parque el Bosque. Armenia, Quindío C) Parque de la Vida, Armenia, Quindío	A) 4 October 2013 B) 13 November 2013 C) 12 April 2014	A-C) Detailed observations by JIGZ, once accompanied by AB.	Chicoral, Espinal, Tolima. In the eastern slope of the central Andes. Around 84 km from the Quindío localities
Sturnella magna (Linnaeus, 1758)	Valle de Cocora, Salento, Quindío	August 2013	Observations and photos of two individuals by AB and YABA. See Figure 2H.	La Esperanza, Cundinamarca. 116 km from the Quindío locality.
Rhynchocyclus fulvipectus (P. L. Sclater, 1860)	Cañón del río Barbas, Filandia, Quindío	22 January 2013	Detailed observation by OHMG of one individual foraging with a mixed species flock.	La Selva, Pueblo Rico, Risaralda. Around 76 km from the Quindío locality.



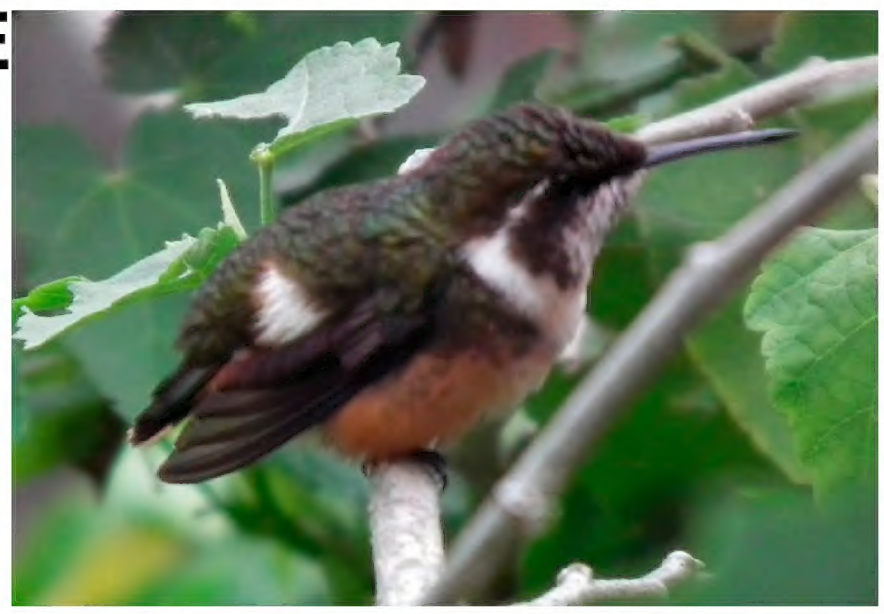


Figure 2. Eight species representing additions to the birds of Quindío. A) *Sarkidiornis melanotos* (photo by DDM), B) *Buteogallus meridionalis* (photo by OHMG), C) *Amazona amazonica* (photo by DDM), D) *Crotophaga major* (photo by GP), E) *Calliphlox mitchellii* (photo by *PJCC*), F) *Conopophaga castaneiceps* (photo by OHMG), G) *Knipolegus poecilurus* (photo by AB), H) *Sturnella magna* (photo by AB).

and the closest vouchered record from elsewhere in Colombia varied between 20 and 200 km (mean = 97 km, Table 1). We also present the records of five species for which the record in Quindío is more than 100 km from the nearest locality (Figure 1).

During the examination of collections we found vouchered specimens for 12 species already documented for Quindío, but only from field observations. These species are: *Laterallus albigularis*, *Porphyrio martinicus* (IAvH-A 727), *Zentrygon linearis* (IAvH-A 5742), *Leptotila plumbeiceps* (IAvH-A 10987), *Eutoxeres aquila* (IAvH-A 6750), *Coeligena coeligena* (IAvH-A 6853), *Veniliornis nigriceps* (IAvH-A 5691), *Cercomacroides parkeri* (IAvH-A 10985), *Mionectes oleagineus* (IAvH-A 10984), *Myadestes ralloides* (IAvH-A 6747), *Catamenia inornata* (IAvH-A 5702), and *Euphonia laniirostris* (IAvH-A 10992). The record of *L. albigularis* corresponds to an individual found dead in the urban area of Armenia, which is part of the new collection of birds from Quindío based on salvaged specimens.

The detailed examination of field notebooks of OHMG produced records for two noteworthy waterbirds: *Tigrisoma lineatum* (24 March 2005, Valle de Maravelez, La Tebaida) and *Heliornis fulica* (24 March 2005, outlet of Quebrada Cristales into La Vieja river, La Tebaida), but the latter was observed briefly and the author could not be confident of the identification. Among the species recorded at e-bird but not recorded by us, nor included in the species list of Quindío (Arbeláez-Cortés et al. 2011), we found that three could be potentially present in Quindío: *Anurolimnas viridis*, *Tyrannulus elatus*, and *Megarynchus pitangua*. However, we cannot obtain additional information to confirm these records (photographs, audio records or vouchers). We consider that the remaining six species listed in e-bird (*Sarcoramphus papa, Phaethornis rupurumii*, *Chalybura urochrysia*, *Cyclarhis gujanensis*, *Elaenia chiriquensis*, and *Saltator maximus*), but not recorded by us nor listed in Arbeláez-Cortés et al. (2011) are dubious for Quindío because there is no evidence for these species in the western slope of the central Andes or in the middle Cauca Valley in the literature.

DISCUSSION

The number of species listed for Quindío (543, Arbeláez-Cortés et al. 2011), plus three new records published recently (*Geotrygon montana*, Marín-Gómez 2012; *Chloroceryle aenea*, Ramírez-Urrea et al. 2014; and *Lonchura oryzivora*, Donegan 2013), and the 14 additions presented here raise the number of species recorded in Quindío to 560. This number confirms Quindío as a hotspot of avian species richness, considering that it encompasses only 0.2% of Colombian territory. Species richness in Quindío will be greater if the records of the possible species can be confirmed, as well as by further records from future explorations. In fact, during the time this manuscript was under review some of the authors and other researchers obtained evidence for the occurrence of at least six additional species for Quindío, but these records will be published elsewhere. Arbeláez-Cortés et al. (2011) considered that exploration in southern Quindío and in the highlands of the north could report new records because they are isolated and understudied, but here we showed that the majority of additions were from localities below 1,900 m a.s.l.; a zone highly transformed by agriculture, livestock and urban areas. This modified landscape could be another area worthy of studies on birds at Quindío, because it still harbors a relatively rich avian fauna whose communities are changing due to modifications in land cover. Below, we discuss the records of some species we consider noteworthy, and also the location of Rincón Santo, Salento.

Tigrisoma lineatum was considered as extirpated from Quindío because the record was a specimen collected more than 50 years ago (Arbeláez-Cortés et al. 2011). The current occurrence of *T. lineatum* in Quindío is corroborated here by one observation, but it probably is very rare due to the great modification of the habitats in the lowlands of the department. *Heliornis fulica* is known from some rivers in Valle del Cauca and Cauca (Garcés-Restrepo et al. 2014) and from Laguna de Sonso, Valle del Cauca (Vidal-A and Cárdenas-C unpublished data). Some of these localities are less than 80 km south of Quindío and the occurrence of the species in the lowlands of Quindío is plausible. However, that observation was short and the author cannot be completely sure of the identification at the moment. Therefore, we consider that *H. fulica* must remain just as potential for Quindío until more evidence will be obtained.

Amazona amazonica is locally fairly common in the lowlands of Colombian Caribe, Magdalena valley and east of the Andes (Hilty and Brown 1986). This species is heavily trapped for the bird trade, is considered a pest in some places, and frequently forms communal roosts in anthropogenically modified landscapes (Restall et al. 2007). The record of this species is the farthest one from Quindío (200 km) that we present here. This record seems to be from a group of released individuals, which probably have established a feral population. A similar situation has been reported for other Psitacidae species in Colombia (Lara-Vásquez et al. 2007). In fact, one of us (DDM) has also observed a pair of *Ara macao* between Armenia and La Tebaida that seems to be living as semi-feral. These records plus the records of other exotic and introduced bird species in Quindío (Arbeláez-Cortés et al. 2011; Donegan 2013) draw attention to the effect of human activities in changes of species composition.

Calliphlox mitchellii is an uncommon hummingbird that inhabits below 2,400 m a.s.l in western Colombia

and Ecuador (Restall et al. 2007). In Colombia it ranges in the pacific, the western Andes, the south of the Cauca Valley, and is known in some localities along the central Andes (Hilty and Brown 1986; SiB-Colombia 2014). The records at Filandia and Armenia city fill a small gap in the range in the western slope of the central Andes, and suggest that *C. mitchellii* is part of the urban avian communities in this Andean region.

Grallaricula flavirostris is an uncommon species ranging from Bolivia to Central America between 500 and 2,200 m a.s.l (Restall et al. 2007; Ridgely and Tudor 2009). In Colombia it is known from the slopes of the three cordilleras (Hilty and Brown 1986). However, in the central Andes of Colombia this species has been recorded only in the northernmost range of this mountain chain in Antioquia department (e.g., Finca Carrizal, Amalfi) by vouchered specimens as well as by field observations (e.g., Delgado-V. 2002). Our record is an individual at IAvH-A collected in 1984, and is 250 km south of those northern records in Antioquia, but only 89 km from the closest record in the western Andes at Risaralda. As suggested by Delgado-V (2002) *G. flavirostris* could have a wider distribution than its actual known range. However it is a small species and is hard to see, passing unnoticed easily (Hilty and Brown 1986; Restall et al. 2007; Ridgely and Tudor 2009).

Conopophaga castaneiceps is uncommon and ranges from Peru to Colombia mostly between 1,000 and 2,000 m a.s.l (Hilty and Brown 1986; Restall et al. 2007; Ridgely and Tudor 2009). In Colombia this species had been recorded in different zones of the slopes of the three cordilleras and in the pacific. Our record is a photograph (Figure 2F) of an individual mistnetted in a small patch of forest in Circasia, and represents the first record of the species from the western slope of the central Andes of Colombia. The closest record in this same mountain range is ca. 130 km north but on the eastern slope (Hacienda la Sofía, Samaná, Caldas), but our record is only 80 km from another record in the western Andes at Risaralda (Table 1).

Aeronautes montivagus is a species that occurs in western and northern South America (Restall et al. 2007). In Colombia is mainly known by visual records (Hilty and Brown 1986; SiB-Colombia 2014). In fact the search of vouchered records only found two specimens and two audio records. The record presented here corresponds to the visual observation of one individual that was in a large flock of *Pygochelidon cyanoleuca*. The flock was flying low over a plowed field, and the individual was in the lowest level of the flock flying faster than the individuals of *P. cyanoleuca*. The white band in the lower belly, that is characteristic of this species, was conspicuous during the observation.

Vireo flavoviridis breeds in Central America and winters in northwestern South America (Restall et al. 2007; Ridgely and Tudor 2009). This species is very similar to *V. olivaceus* and usually both species forage together, in a similar fashion, making their differentiation difficult (Restall et al. 2007; Ridgely and Tudor 2009). In fact, a recent study reports that this species has passed unnoticed for at least 40 years in Cundinamarca department at the eastern Andes of Colombia, according to vouchered specimens (Acevedo-Charry and Echeverri-Mallarino 2013). Our records of *V. flavoviridis* are from October, November, and April, matching the period of transit across Colombia during their migration (Eusse-González 2012; Acevedo-Charry and Echeverri-Mallarino 2013).

Sturnella magna is a widespread species that seems to have a disjunct population in northern South America (Hilty and Brown 1986; Restall et al. 2007; Ridgely and Tudor 2009). In Colombia the species ranges mainly in the east of the country. Our record is a series of photographs (Figure 2H) of two individuals. This record plus some observations in Manizales (Botero et al. 2005, AB personal observations) represent the first reports of this species in the western slope of the central Andes. These records could represent a recent range extension, probably promoted by deforestation (Restall et al. 2007).

Besides the new records of species our data allow us to comment on a geographic issue. The locality Rincón Santo was visited by one of us (JEMS), who collected the specimens documented here, and the information presented is from the original expedition of INDERENA in 1984. Rincón Santo is not reported in the gazetteers we consulted, but we found it in Renjifo et al. (2002). However, Renjifo et al. (2002) indicate geographical coordinates that correspond to a point at a higher elevation, near the region of Alto Quindío. It is noteworthy because Rincón Santo harbors several species represented by vouchered specimens (SiB-Colombia 2013), and this correction in their location allows increased precision in further geospatial analyses.

Approximately half of the bird species from Quindío are represented in scientific collections by at least one individual (Arbeláez-Cortés et al. 2011), and collections are still useful to identify new records and to add support to other records. These facts corroborate the great value of biological collections for the knowledge of Colombian biodiversity (Cuervo et al. 2006). However, we consider that collecting effort must be continued to obtain new material (e.g., tissue samples) and new information for the species of this region, which are mainly represented by old specimens in foreign collections (Arbeláez-Cortés et al. 2011).

It is well known that biodiversity is a unique and irreplaceable natural capital commonly bonded to the cultural and artistic expressions of human populations. The relatively high bird species richness of Quindío, which includes species endemic and species of

conservation concern, can be considered as a proxy of the high biodiversity that harbors this region. This situation emphasizes the necessity of clear and scientifically informed conservation plans. We stress that scientific knowledge of biodiversity must be considered as central in the decisions about the plans for the use of the land in this region of Colombia, which at present is in a critical point due to mineral exploitation projects, construction of energy transmission infrastructure, urban growth, and intensive or unplanned tourism activities.

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